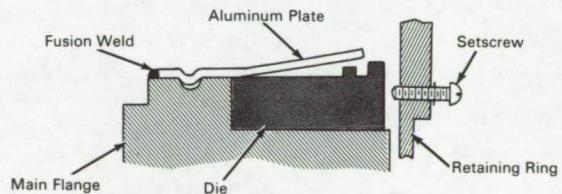
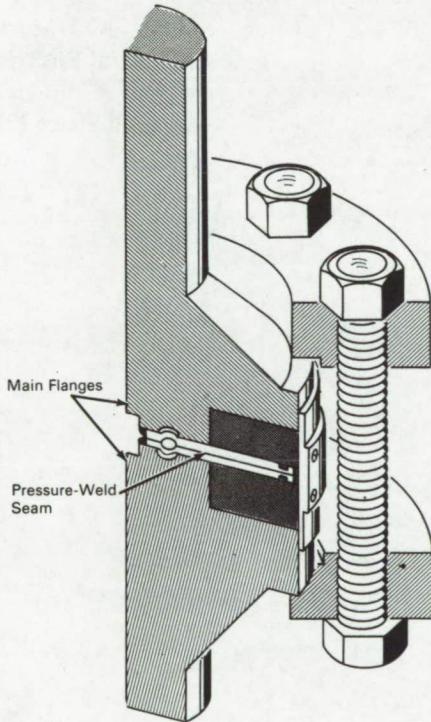


NASA TECH BRIEF



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Pressure-Welded Flange Assembly Provides Leaktight Seal at Reduced Bolt Loads



DETAIL, LOWER DIE SECTION

The problem:

To design a vibration-resistant flange-connector assembly that will provide a leaktight seal under reduced bolt loads. Conventional separable flanged tube connectors possess varying degrees of sensitivity to reduction in bolt load.

The solution:

A connector assembly consisting of ductile metal plates that are pressure welded between dies mounted in recessed flanges.

How it's done:

Two sets of stainless steel split dies, containing annular projections on their inner surfaces, are inserted into recesses in the main flanges, which are made of stainless steel. Two round plates of type 2S aluminum are fusion welded to the outer peripheries of the main flanges. An aluminum retaining ring is positioned inside the bolt circle and secured with set screws to hold the dies in place. The ring has several viewing ports to permit visual inspection of the dies during the bolt tightening operation.

(continued overleaf)

As the bolts are tightened under a specified torque, the soft aluminum plates are forced together between the dies to effect a pressure welded seal at the aluminum interfaces. Should the original tensile forces applied to the bolts become relaxed during service, the alternate load path provided by the geometry of the die rings minimizes the amount of displacement in the weld area.

To disassemble the connector, the bolted flanges and retaining ring are removed, and the main flanges are slightly separated to allow the welding dies to be removed and replaced with a set of cutting dies. When the bolts are retightened, the 2S aluminum plates are severed just inside the pressure weld, and the connector can be disassembled.

To reassemble the connector, two other sets of welding dies with projections placed closer to the center of the connector are used. Cutting dies with a smaller radius are used to disassemble the connector a second time.

Notes:

1. The flange connector assembly, tested with helium gas under the following conditions, showed leakage of less than 10^{-7} atm cc/sec:
 - a. Room temperature and 6000 psi.
 - b. -321°F and 6000 psi.
 - c. Room temperature, 200 psi, 200,000 vibration cycles, and 25% of the original bolt torque of 200 ft-lb.
2. Inquiries concerning this invention may be directed to:

Technology Utilization Officer
Marshall Space Flight Center
Huntsville, Alabama 35812
Reference: B66-10247

Patent status:

Inquiries about obtaining rights for the commercial use of this invention may be made to NASA, Code GP, Washington, D.C. 20546.

Source: A. J. Martenson et al
of General Electric Company
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